HEMATOLOGY[1]

I. INTRODUCTION

A. OUTLINE OF HIGHLIGHTED CONDITIONS

1) Iron-Deficiency Anemia

2) Thalassemia

3) Bleeding Disorders

B. IMPLICATIONS FOR JOB PERFORMANCE

Anemia can limit exercise capacity and therefore an officer's ability to safely perform in the following situations:

- Running in Pursuit of Suspects: speed is important in up to 90% of incidents, distances may range up to 500 yards.
- Pursuit May Be Followed by Physical Altercation: subduing combative suspects takes an average of 3 minutes.
- Moving Incapacitated Persons: ability to lift and carry someone distances of 40+ feet when speed is critical.

These activities may require an exercise capacity of up to 12 METS (Jette, et al.,1990; see discussion in Respiratory section).

Bleeding disorders and anticoagulants increase the risk of serious complications from even minor episodes of blunt or penetrating trauma.

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II. EVALUATION OF COMMON CLINICAL SYNDROMES

1) IRON-DEFICIENCY ANEMIA (IDA)

IDA is common among candidates, especially females who are avid runners. Research has shown that running can contribute to iron loss through hematuria, subclinical GI bleeding, sweating, decreased absorption, and mechanical trauma to the foot (Eichner, 1986; Newhouse & Clement, 1988). Relatively severe IDA (hemoglobin <10 gm%) will clearly impair athletic performance (Newhouse & Clement, 1988; Celsing, et al., 1986). Impairment due to mild IDA remains controversial, but several studies provide enough evidence to warrant concern. A survey of female agricultural workers in Sri Lanka found that those with hemoglobin levels of 11.0-11.9 gm% were 20% less productive than those with levels >13 gm% (Gardner, et al., 1975). Rowland, et al. (1988) found that treatment improved treadmill performance in seven women who had mild IDA with hemoglobin levels above 12 gm%. An additional study of Guatemalan manual laborers found that short duration near-maximal exercise capacity was impaired even with the mildest degrees of anemia (Viteri & Torun, 1974). Treatment with iron substantially improved performance within one month.

Given this potential for IDA to impair performance, the physician should require candidates to undergo either dietary iron supplementation to normalize their hemoglobin levels, or exercise testing to demonstrate a capacity of at least 12 METS.

2) THALASSEMIA

Thalassemia is a genetic disorder characterized by absent or diminished synthesis of either the alpha or beta chains in the hemoglobin molecule. The prevalence of heterozygotic Thalassemia "minor" is reported to be common in African, Mediterranean, and Oriental populations. Clinically, there is usually mild microcytic anemia with hematocrits greater than 32%. Since these anemias are chronic, these patients usually have normal cardiovascular capacity. However, any question regarding a particular candidate should be assessed with an exercise test. Homozygous thalassemia ("intermedia" and "major") is a very grave condition resulting in premature death, poor growth, absent secondary sexual characteristics, and multiple endocrine deficiencies.

3) BLEEDING DISORDERS

Having a bleeding diathesis secondary to clotting disorders, or the use of warfarin, increases the risk of serious injury as a result of physical trauma associated with subduing combative suspects and other essential job functions. Bleeding into joints, the retroperitoneal area, and intra cranial bleeding are of concern. However, these complications will not cause incapacitation nor impair the performance of

essential functions within the 5-15 minute time span typical of most critical incidents. Therefore, these candidates do not generally pose a risk of harm to others while performing patrol duties. One exception would be a candidate with severe thrombocytopenia (platelet counts < 5000) or a major platelet dysfunction disorder (Lieberman, 2001).

Intra cranial hemorrhage (ICH) from minor head trauma poses the greatest risk of harm to self. In untreated patients with hemophilia, this occurs following about 10% of head injuries (unselected for severity), and has a mortality rate of 20-50%. However, Andes, et al. (1984) found that ICH can be prevented if clotting factors are administered within 6 hours of the head trauma. This could be done in an ER or by self-administered infusions. Some patients with severe factor deficiencies may have a history of spontaneous bleeding into joint spaces with sports activities. However, this can usually be prevented with prophylactic home infusions 2-3 times per week. Trauma from wrestling and other self-defense training at the academy may cause muscle hematomas. However, this can also be prevented with prophylactic treatment. [Note: there is at least one professional hockey player with hemophilia (DeBenedette, 1992).]

An acceptable candidate should meet the following criteria:

1. No history of severe thrombocytopenia (platelet counts < 5000) or a major platelet dysfunction disorder,

2. Demonstrated history of successful participation in contact sports without recurrent bleeding complications,

3. Documentation via medical records that the candidate possesses adequate knowledge of his/her disease and has acted responsibly in the past to obtain therapy in a timely manner,

4. Absence of permanent joint damage which would interfere with the safe performance of duties (see Musculoskeletal section).

5. Absence of advanced infectious disease (i.e., hepatitis B/C, and HIV) which would impair the performance of duties over the next two years (see Infectious Disease section.)

6. Written acknowledgment from the candidate that he/she is aware of the following facts and associated personal risks:

    - The mortality from ICH is 20-50%; those who survive often have permanent neurological impairment.

    - Field work creates an imminent and substantial risk of head trauma.

- To reduce the risk of ICH, it is imperative that the candidate obtain factor replacement or a medical evaluation as soon as possible following any trauma to the head or face.

- Early therapy of head trauma must not be delayed regardless of the lack of symptoms, fears of developing serum inhibitors to replacement factors, or cost considerations.

- While effective, early therapy will not eliminate the risk of death from minor head trauma in persons with severe factor deficiencies, or who have serum inhibitors to replacement factors.

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